

The Systematics of the Charaxidae (Lepidoptera: Nymphaloidae)

By A. H. B. RYDON, F.R.E.S.

(Continued from p 287)

(5) Subfamily PREPONINAE *subfam. n.*

(Type-genus: *Prepona* Boisduval, 1836, *Hist. nat. Ins.*, Spec. gén. Lépid. vol. 1, pl. 7 (=pl. 3b); type-species: *Nymphalis demodice* Godart, 1824.)

This subfamily consists of *Prepona*, *Agrias*, *Archaeoprepona* and *Anaemorpha*, as well as a new genus that I am erecting here for *Nymphalis* (*Prepona*) *chromus* Guérin-Méneville. The wing-venation of the Preponinae is quite close to that of the Charaxinae, the subcostal veins in the forewing running free, with veins 7 and 8 being longer than the common stalk, and with vein 8 curving downwards near its termination at the outer margin of the forewing below the apex. The palps are also somewhat *Charaxes*-like, but are erect, not S-shaped, and are densely squamose, with a dorsal tuft of hair-like scales at the end of the middle segment, and are light-coloured below. The middle segment of the palp in *Archaeoprepona* is about the same length as in *Charaxes* (i.e. about four times the length of the basal segment), but in *Prepona* and *Agrias* the middle segment of the palp is shorter, approximating more to that of *Euxanthe*, being about three times the length of the basal segment. The basal sensory patch of the palps (Reuter's "Basalfleck"), as already noted, is somewhat similar to that of *Charaxes* (i.e. somewhat elongate, conical in shape, and extending distad from the base of the basal segment). The tarsus of the forelegs of the males of *Prepona* is almost as long as the tibia, whereas in *Charaxes* the tarsus is always noticeably shorter than the tibia. In *Agrias* and *Prepona* the femur, tibia and tarsus of the hindlegs are about the same length, while in *Archaeoprepona* these structures

EXPLANATION OF PLATES

- Fig. 7. *Prepona demophon* (L.); 7, larva; 7a, pupa. (British Guiana, 1931).
 Fig. 8. *Zaretis itylus* (West.); 8, larva; 8a, pupa. (British Guiana, 1931).
 Fig. 9. *Siderone marthesia* (Cr.); 9, larva; 9a, pupa. (Trinidad, 1937).
 Fig. 10. *Siderone nemesis* (Illiger); 10, larva; 10a, pupa. (Cuba, 1931).
 Fig. 11. *Anaea phidile* Geyer; 11, larva; 11a, pupa. (Rio de Janeiro, 1929).
 Fig. 12. *Cymatogramma verticordia* (Hbn.); 12, larva; 12a, pupa. (St. Lucia, 1928).
 Fig. 13. *Memphis porphyrio* (Bates); 13, larva (Belem, Brazil, 1929).
 Fig. 14. *Memphis morvus* (F.); 14, larva; 14a, pupa. (Rio de Janeiro, 1928).

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PLATE XI



Larvae and pupae of Neotropical Charaxidae

are unequal in size. The forewing of *Agrias* is relatively short and broad, and is triangular in shape, being right-angled at the tornus; while in *Prepona* and *Archaeoprepona* the forewing is more elongate and falcate in appearance; so that, if one divides the length of the antenna of the latter two genera by the length of the forewing, one finds that the antennawing ratio (A/W ratio) in the males of *Agrias* is greater than that of the two last-mentioned genera. For example, the A/W ratio in *Agria claudina* Godart is 0.585, compared with that of 0.5 in *Prepona omphale* Hübner. In *Agrias narcissus* Staudinger the A/W ratio is as much as 0.635. As already noted *Agrias* and *Prepona* have, in the males, a prominent light-coloured (yellowish) hair-tuft near the base of the anal fold on the upperside of the hindwing, while in *Archaeoprepona* the hair-tuft is dark in colour. In *Agrias* and *Prepona* the antenna have light red tips; in *Archaeoprepona* the tips are black. If one were to go solely by the wing pattern of *Prepona* and *Agrias*, one would not hesitate to separate *Agrias* (with its resplendent rainbow colours and its distinctive upperside and underside patterns) from *Prepona* (with its relatively austere greenish-blue median band on a deep purple or black background), but as the early stages of the two genera (c.f. figs. 25, 26, 19, 24) and the male genitalia (cf. figs. 33, 34) are closely similar, one must conclude that these two genera are, in fact, closely related, the blue-banded *Prepona* species being but mimics of the similarly coloured *Archaeoprepona* species, and *Agrias* mimicking some species of the Eunicid genera, *Catagramma* and *Callithea*. These are examples of "simple" or "primitive" mimicry, a subject that has been dealt with by van Somersen and Jackson (1960). With regard to *Agrias*, Fruhstorfer (1916) stated that "as to their exterior the *Agrias* (species) are to be divided into two groups; the species with a red upper surface, and those with a variegated upper surface being beneath spotted preponderantly with yellow or green. Both the groups are united by *A. amydon* with partly reddish, partly yellowish, coloured females". Two species of Fruhstorfer's genus *Archaeoprepona*, namely *Nymphalis (prepona) chromus* and *Prepona priene* Hewitson, however, differ from nominate *demophon* in certain morphological respects; hence they should, in my opinion, be placed in a separate genus of their own, namely

NOREPPA *genus n.*

(Type-species : *Nymphalis (Prepona) chromus* Guérin-Ménéville, 1844, *Icon. Règne. Cuvier*, 7 Ins. p. 478).

Noreppa differs from *Archaeoprepona* (and *Prepona*) in having the eyes hairy; the palps not uniformly smooth but with some long brown hairs projecting from the lateroventral surface, thus giving them a darker appearance below than in *Archaeoprepona*; the mid and hind tibiae and tarsi spined above and below; the male genitalia with the valves more elongate, and with a shorter aedeagus, and a pair of longer subuncal projections ending in heavily

sclerotized unciform structures that converge medially below the uncus (cf. figs. 31, 32). *N. chromus* also differs from *Archaeoprepona* (as typified by *Papilio demophon*) in having the uppersides of the forewing unicolorous black, without a blue median band, and the hindwing with a quadrate greenish-blue patch in the discal area, not extending above vein seven, and with a submarginal row of black subpupillated spots, partially outlined with light brown, in cellules 1c-6 and the underside of the wings crossed by an almost straight transverse submedial dark line composed partly of discontinuous black lines and outlined proximally with some lighter coloration.

To the above genus also belongs *Prepona priene* in which there is a blue median band in the forewing, which, however, is discontinuous with the blue discal patch of the hindwing.

The egg of *N. chromus* is globular and smooth, being about 1.8 mm in diameter. The newly hatched larva has a head which is much wider than the body, being without horns on the head, or long caudal appendages. (There is an egg-shell of *chormus*, with its newly hatched larva, in the Rothschild collection of the British Museum (Natural History)).

The last member of this subfamily still needing to be discussed here is *Anaemorpha* which Rothschild (1894) considered stood midway between *Anaea* and *Prepona*. The genus, however, was placed with the Preponinae by Fruhstorfer (1916), which I think is the correct place for it, since unlike the *Anaeinae*, *Anaemorpha splendida* Rothschild (type-species of the genus) is a powerfully built butterfly, with a large deep thorax and a short conical abdomen, and has long stout antennae, although the pattern of the underside of the wings, with the median dark line crossing both wings, and the outer third of both wings being speckled with light, silvery scales, is somewhat reminiscent of certain members of the *Anaeinae*. However, it differs in a number of respects from the other members of the Preponinae too. The eyes are naked, as in *Archaeoprepona* and *Prepona*, but the mid and hind tibiae and tarsi are spined above and below as in *Noreppa*. The hindwing cell is open, whereas it is closed in all the other Neotropical Charaxids. The antennae are dark red, a character that was used by Fruhstorfer (1916) in his subdivision of the *Prepona* group of species. The palps are somewhat *Charaxes*-like, being S-shaped and porrect. The basal sensory patch of the palps is broad and elongated, which places *Anaemorpha* somewhat between *Prepona* and *Polygrapha* (the latter being treated here as a member of the *Anaeinae*); but the specialized scales, near the base of the underside of the dorsum of the forewing, do not extend into space 1b as they do in most of the *Anaeinae*, so that *Anaemorpha*, in this respect, should be placed among the Preponinae rather than the *Anaeinae*. *Anaemorpha* has a strongly falcate forewing, and the hindwing is produced at the

anal angle. It also differs from the other members of the Preponinae in having a light metallic greenish basal patch in the discal area of the forewing above. The male genitalia of *Anaeomorpha* are quite distinctive. The short stout uncus is terminally hooked, and is slightly shorter than the broad and strong tegumen; the thick valves are short and somewhat triangular in shape (like those of *A. demophon*), being broad at the base and narrow at the denticulated apex. The gnathos consists of a pair of small, thin, discrete plates below the uncus there being no subuncal projections as are found in *Prepona*, *Agrias* and *Archaeoprepona*; the aedeagus is relatively short, strong, rod-like and pointed distally; the juxta is quite long and solid, somewhat *Charaxes*-like in appearance, but without a terminal ventral hook.

On the preceding characters the Preponinae can be divided into the following tribes:—

- (1) Shaft of antenna black; hindwing not produced at anal angle; cell of hindwing closed 2
 — Shaft of antenna dark red; hindwing produced at anal angle; cell of hindwing open

tribe ANAEOMORPHINI *tribus n.*

(type-genus: *Anaeomorpha* Rothschild, 1894, *Novit zool.*, vol. 1, p. 687; type-species: *A. splendida* Rothschild, 1894).

This is a monotypic tribe

- (2) Eyes hairy; palps with long brown hairs on the latero-ventral surface; mid and hind tibiae and tarsi spined above and below; male genitalia distinctive (see fig. 32 ...

tribe NOREPPINI *tribus n.*

(Type-genus: *Noreppa* Rydon; type-species: *Nymphalis (Prepona) chromus* Guérin-Méneville, 1844). This small tribe contains also *N. priene*.

- Eyes naked; palps light-coloured below, without dark hairs; mid and hind tibiae and tarsi spined below only ... 3

- (3) Antennae black at the tip; hair-tufts in hindwings of males dark; male genitalia distinctive (see fig. 31)

tribe ARCHAEOPREPONINI *tribus n.*

(Type-genus *Archaeoprepona* Fruhstorfer, 1916, in Seitz, *Macrolepidoptera of the World*, vol. 5, p. 553, type-species: *Papilio demophon* L., 1758). This tribe contains some 7-odd species which can be subdivided into several groups on differences in the underside pattern of the wings and the male genitalia. More knowledge of the early stages of this tribe is needed to elucidate the true relationships of the species comprising it.

- Antennae red at the tip; hair-tufts on hindwings of males light-coloured (yellowish); male genitalia distinctive (see figs. 33, 34). tribe PREPONINI *tribus n.*

(Type-genus: *Prepona* Boisduval; type-species: *P. demodice* (Godart). This tribe, which includes *Agrias*, can be subdivided into two subtribes, using the key below:

- (1) Forewings elongate, somewhat falcate; upperside pattern of wings normally with a blue median band on a darker

blue, or black, background in the males; antenna about half the length of the forewing in the males

subtribe PREPONINA *subtribus n.*

(Type-genus: *Prepona* Boisduval). This subtribe consists of some 23 species, according to Stichel and Bryk (1939), which, on the pattern of the upperside and underside of the wings, can be subdivided into a number of distinct groups; hence this group is not particularly homogeneous.

- (2) Forewing broad and triangular, right-angled at the torus, with the outer margin straight; upperside pattern of wings variegated; antenna normally more than half the length of the forewing in the males

subtribe AGRIASINA *subtribus n.*

(Type-genus: *Agrias* Doubleday, 1844, *List. Spec. lep. Ins. Brit. Mus.*, vol. 1, p. 106; type-species: *A. claudina* Godart, 1824 (not *Papilio claudia* Schulze; *vide* Cowan, 1970, p. 40)). Stichel and Bryk (1939) list eight species of *Agrias* with numerous subspecies. As noted above, *Agrias* can also be subdivided on the pattern of the upperside and the underside of the wings into several distinct groups.

(6) Subfamily ZARETIDINAE *subfam. n.*

(Type-genus: *Zaretis* Hübner, 1819, *Verz. bekannt. Schmett.*, vol. 4, p. 49; type-species: *Papilio isidora* Cramer, 1779.)

This subfamily consists of the brown *Zaretis*, the red and black *Siderone*, and possibly also the large fulvous *Coenophlebia*, with its markedly acuminate forewings. The Zaretidinae appear to be intermediate between the Preponinae and the Anaeinae (*q.v.*) They differ from the former in the shape and pattern of the wings, the wing venation, and also in the male genitalia which are closer to the Anaeinae (see Comstock, 1961, for figures of the genitalia); but the palps of *Zaretis*, *Siderone* and *Coenophlebia* are strong, porrect, whitish in colour below, and in these respects are more like those of the Preponinae. The specialized scales near the base of the underside of the forewing, in the members of this subfamily, do not extend beyond vein 1 into space 1b as they do in most of the Anaeinae. Reuter (1896), on an examination of the basal sensory patch of the palps, concluded that *Zaretis* and *Siderone* were more closely related to the Preponinae than to the Anaeinae. In *Zaretis* and *Siderone* the sensory basal patch is elongate and conical in shape, but in *Coenophlebia* it is relatively small and triangular in structure, being pulled out in its full length as in *Anaea*, although the palp itself is strong and somewhat S-shaped terminally, and is thus nearer in appearance to *Zaretis* and *Siderone* than to *Anaea*. *Coenophlebia* also differs from *Zaretis* and *Siderone* in having veins 5 and 6 of the forewing arising from a common stalk, some distance from the apex of the cell—an arrangement of the veins that is approximated to a lesser degree in *Polygrapha*

cyanea Salvin and Godman which is treated here as a member of the Anaeinae (*q.v.*). It is thus possible that *Coenophlebia* really belong to the Anaeinae rather than to the Zaretidinae, but this matter will only be resolved when the early stages become known. The members of the Zaretidinae, as already noted, were placed by Comstock (1961) in his omnibus genus "*Anaea*", but *Zaretis* and *Siderone* do not, in my opinion, belong with the Anaeinae, since, apart from morphological differences in the adults, they also differ in the early stages—the larvae, for example, (figs 8, 9, 10) being closer in appearance to those of the Preponinae (figs. 7, 25, 26), than to those of the Anaeinae (figs. 11-14, 29, 29a), although the pupae (figs. 8a, 9a, 10a) are more like those of the Anaeinae (figs. 11a, 12a, 14a, 29b), thus indicating (as Schatz and Röber (1892), and others have suggested) that the Zaretidinae are intermediate between the Preponinae and Anaeinae. Schatz and Röber (1892, p. 169), in fact, separated *Zaretis*, *Siderone* and *Coenophlebia* from the *Anaea* group on the basis of the early stages, placing them with *Charaxes* and *Prepona* in their "*Nymphalis*" group. As previously noted, Comstock (1961) drew attention to a peculiarity found in the Anaeinae, namely the tubular, vein-like structure which arises from the third axillary sclerite and extends distad for a short distance along the inner margin of the hindwing, which he considered might be an ambient vein. This "ambient vein" is only vestigially present in the Zaretidinae, but is absent in the Preponinae. The Zaretidinae can be subdivided into three tribes, using the following key:

- (1) Imagos large in size; apex of forewing strongly produced; hindwing rounded, not produced at the anal angle; veins 5 and 6 of the forewing arising from a long common stalk tribe COENOPHLEBIINI *tribus n.* (Type-genus: *Coenophlebia* Felder and Felder, 1862, *Wien. ent. Monats.*, vol. 6, p. 422 *nota.*; type-species *Siderone archidona* Hewitson, 1860.)
This tribe contains only the one genus of which there are two recognized geographical races.
- Imagos medium-sized; apex of forewing not so strongly produced; hindwing produced at the anal angle; veins 5 and 6 of the forewing arising separately from the apex of the cell 2
- (2) Forewing somewhat falcate, with the inner margin emarginate at the tornus; the fourth subcostal vein (V. 8) of the forewing ending in the costa, basad of the apex; forewing often with a hyaline macule at the base of cellules 2 and 3 respectively; colouring of upperside of both wings typically tawny tribe ZARETIDINI *tribus n.* (Type-genus: *Zaretis* Hübner, 1819)
In the genus *Zaretis*, Comstock (1961) included *Siderone syene* Hewitson and *Nymphalis callidryas* Felder. It is doubtful, however, whether these last two taxa are in fact congeneric with the type-species *Z. isidora* (Cramer),

although *syene* is closer to *isidora* than to *callidryas*, the latter differing from the previous two species in having the first three subcostal veins of the forewing anastomosing with the costal vein, and also in the female having a tail at vein 4 of the hindwing.

- Forewing with the outer margin broadly convex before a slight emargination at the apex; the fourth subcostal vein of the forewing ending in the apex; colouring of wings upperside velvety black with red markings

tribe SIDERONINI *tribus n.*

(Type-genus: *Siderone* Hübner, 1823, *Samml. exot. Schm.* vol. 2, pl. 56; type-species: *S. ide* Hübner, 1823). This tribe consists of only one genus which contains several good species, although Comstock (1961, p. 27), contrary to Röber (1916), said *Siderone* "only includes one highly variable species".

(To be continued)

A Review of the Butterflies in the Bristol Area

(Continued from p 240)

By A. D. R. Brown

Callophrys rubi Linn. (Green Hairstreak)

We have records from thirteen localities, but no doubt many more exist owing to the fact that this species is easily overlooked. Where it does occur it is rarely plentiful, and in some places it is on the decline. One of these is Priddy in the Mendip Hills where it was quite common at one time, but the effects of the Forestry Commission are beginning to be felt. At Wetmoor in West Gloucestershire it is protected along with many other species, and small numbers are seen there each year. The Green Hairstreak is often observed at Goblin Combe but only in ones and twos. Many fresh discoveries of colonies in the Cotswolds have recently been made, as well as others in the Mendip Hills.

Strymon w-album Knoch (White Letter Hairstreak)

This butterfly has recently been discovered in several places within Bristol itself, which is a very good sign. On either side of the Avon Gorge, this species has been seen from time to time, but mostly high up in the Wych Elm trees. In 1966, a larva was beaten from a low branch of one of these trees, and later on a butterfly was seen on some nearby bramble blossom. To the north of Bristol not far from Henbury, specimens have been noted much more frequently, and various evidence points to the fact that it may be on the increase. At Whorlebury Hill near Weston-super-Mare, single specimens have been found occasionally, not only as adults but also as larvae, and once a pupa. However, it often appears to be absent from this locality.